Novel Tools and Technologies for Translational PET Imaging of Cell-based Therapies

Grant Award Details

Novel Tools and Technologies for Translational PET Imaging of Cell-based Therapies

Grant Type:	Tools and Technologies I
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Investigator:

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Institution:	University of California, Los Angeles
Type:	PI

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Progress Reports

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Grant Application Details

Application Title:	Novel Tools and Technologies for Translational PET Imaging of Cell-based Therapies

Public Abstract: One of the great promises of stem cell research is that doctors will find a way to isolate and modify patient's stem cells so that they be reinjected into patients to treat their disease. Current examples include islet cell transplantation to treat diabetes, stem cells for treating heart failure, or engineered immune cells for treating cancer. However, a key challenge is to be able to monitor the cells after they have been administered. Scientists need to be able to follow the transplanted cells, to see if they survive and engraft, home to areas of disease, and whether they are able to reestablish the activity needed to counteract disease.

We are developing novel tools to follow the fate and function of transplanted stem cells, based on a powerful medical camera called the PET scanner. PET imaging, or positron emission tomography, allows doctors to visualize the biology of cells in living organisms, including patients. Three ways to follow transplanted cells are being developed. In one, distinctive changes of functions inside cells will be probed using radioactive small molecules. In a second approach, antibodies will be used to detect cells based on distinctive markers on the surface of the transplanted cells. In the third approach, the transplanted cells themselves will be "marked" using genes that will cause the cells to emit a signal detectable by the PET scanner. Our interdisciplinary team has already demonstrated examples of these approaches and how they can be implemented in the clinic.

Tools for watching transplanted cells will provide highly valuable information that will refine research, accelerate development, and most importantly, allow physicians to directly monitor their activity and effects in patients.

Statement of Benefit to California: California has asserted a lead position in stem cell research and development of cell-based therapeutics. However, we currently lack good methods to follow transplanted cells once they are infused back into the patient, and knowledge about the survival, homing, and therapeutic activity of these cells will be critical for developing effective treatments. California has also led innovation in the field of molecular imaging, which can provide precisely the tools needed to monitor and evaluate cell based therapies.

This proposal provides a unique opportunity to capitalize on the innovations of the California molecular imaging community, and to focus it on the specific needs of the stem cell community. The potential synergies generated locally and within the state will serve to accelerate overall progress and stands to benefit Californians first.

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